## REMARKS

Applicants have amended their claims in order to further clarify the definition of various aspects of the present invention. Specifically, Applicants have cancelled claims 1-3 without prejudice or disclaimer, and are adding new claims 4-12 to the application. Of these newly added claims, claims 4 and 10 are independent claims, each directed to a stirring apparatus.

Independent claim 4 recites that the apparatus includes a specified vertical cylindrical vessel and a partitioning cylinder disposed inside this vessel which partitions the cylindrical vessel into inner and outer compartments concentric to a center thereof. Claim 4 goes on to recite an inlet and an outlet respectively (a) through which a process solution is supplied into the outer compartment and (b) disposed inside the inner compartment through which the process solution is evacuated, the stirring apparatus also including stirring blades disposed in the inner and outer compartments respectively, the stirring blade in the inner compartment stirring a process solution therein and the stirring blade in the outer compartment stirring a process solution therein, each of the stirring blades rotating concentrically around the center of the cylindrical vessel. Claim 4 also defines a rotating shaft for the stirring blade of the outer compartment, fixed thereto, which rotating shaft is disposed above the inner compartment inside the cylindrical vessel and whose lower end is located above the inner compartment and is at a location higher than an upper edge of the partitioning cylinder, and recites that the process solution in the outer compartment enters the inner compartment over the upper edge of the partitioning cylinder in a reaction proceeding by the stirring of the blades.

In connection with claim 4, note, for example, to be illustrative and not limiting, Fig. 4, and descriptions in connection therewith on pages 19-21 of Applicants' specification (in connection with the second reactor).

Claim 5, dependent on claim 4, recites that the apparatus further includes a heater disposed inside at least one of the inner and outer compartments, which heats the process solution thereinside; and claims 6 and 7, dependent respectively on claims 5 and 4, recite that the apparatus further includes another outlet disposed inside the cylindrical vessel, through which a volatile matter generated during a process inside the inner or outer compartment is evacuated. Claims 8 and 9, each dependent on claim 4, respectively recites that the stirring blade disposed in the inner compartment is also fixed to the rotating shaft, at a location higher than the upper edge of the partitioning cylinder; and recites that the stirring blade disposed in the inner compartment is also fixed to the rotating shaft, at the lower end thereof.

Independent claim 10 defines a stirring apparatus including a specified vertical cylindrical vessel; a compartment, inside of which a process solution provided is reacted; and an inlet through which the process solution is supplied into the compartment. Claim 10 further recites that the apparatus includes stirring blades disposed in the compartment which stir a process solution thereinside and rotates around a center of the compartment; and a rotating shaft for the stirring blades of the compartment, fixed to the stirring blades, which is disposed above the compartment inside the cylindrical vessel, and whose lower end is located above the stirring blades and the process solution, so that the stirring blades disposed in the compartment are disposed without any counterpart rotating shaft at the center in the compartment, around which center the stirring blades rotate. As to what is meant by "without any counterpart rotating shaft", note, for example, the paragraph bridging

pages 8 and 9 of Applicants' specification. Clearly, Applicants' original specification defines what is meant by the stirring blades being provided "without any counterpart rotating shaft" therein, sufficient to satisfy the requirements of the second paragraph of 35 USC 112, as discussed infra. Claims 11 and 12, each dependent on claim 10, respectively recites that the blades are attached to the lower end of the rotating shaft; and recites that the rotating shaft does not extend into the compartment.

The rejection of claim 1 under the second paragraph of 35 USC 112, as being indefinite, set forth in Item 2 on page 2 of the Office Action mailed March 7, 2006, is respectfully traversed, particularly insofar as applicable to the claims as presently amended. In this regard, attention is again respectfully directed to the paragraph bridging pages 8 and 9 of Applicants' specification. This indicates what is meant by the stirring blades in the central reaction compartment being provided "without any counterpart rotating shaft therein". That is, this means that the rotating shaft has a lower end located above the central reaction compartment without extending into the central reaction compartment. It is respectfully submitted that such structure is especially clear as seen in, for example, Figs. 4 and 6 of Applicants' original disclosure, especially taken together with the description on pages 19-21 of Applicants' specification corresponding to Fig. 4 and on pages 22 and 23 of Applicants' specification corresponding to Fig. 6. That is, as can be seen in Fig. 4, and as described in Applicants' specification, the rotating shaft 403 has a lower end such that the rotating shaft does not extend into the second compartment 407, while the stirring blades 409 do extend into the second compartment 407.

As can be seen in the foregoing, recitations with respect to the rotating shaft and stirring blades according to the present invention, and, in particular, recitation of the stirring blades being provided "without any counterpart rotating shaft at the

center in the compartment", is sufficiently definite so as to satisfy requirements of the second paragraph of 35 USC 112.

The interpretation by the Examiner set forth in Item 2 on page 2 of the Office Action mailed March 7, 2006, that the recitation in the claims of the stirring blades being provided in the inner reactor "without any counterpart rotating shaft along the rotation center" reads on any stirring blade having a rotational shaft, is respectfully traversed, particularly insofar as applicable to the claims as presently amended. Thus, it is noted that claims 4 and 10, the independent claims in the application, respectively recites that the lower end of the rotating shaft is located above the inner compartment and is at a location higher than an upper edge of the partitioning cylinder; and recites that the rotating shaft is disposed above the compartment inside the cylindrical vessel and whose lower end is located above the stirring blades. Note also claims 8, 9, 11 and 12. Clearly, the interpretation by the Examiner of previously considered claims "as reading on any stirring blade having a rotational shaft" is incorrect, especially as related to the claims presently in the application.

Applicants respectfully submit that all of the claims presented for consideration by the Examiner patentably distinguish over the teachings of the prior art applied by the Examiner in rejecting claims in the Office Action mailed March 7, 2006, that is, the teachings of the U.S. patents to Weber, No. 3,322,505, and to Buchanan, No. 1,667,838, under the provisions of 35 USC 103.

It is respectfully submitted that these references as applied by the Examiner would have neither taught nor would have suggested such a stirring apparatus as in the present claims, having stirring blades disposed in inner and outer compartments respectively, the stirring blade in the inner compartment stirring a process solution therein and the stirring blade in the outer compartment stirring a process solution

therein, each of the stirring blades rotating concentrically around the center of the cylindrical vessel; with the apparatus further including a rotating shaft for the stirring blade of the outer compartment, fixed thereto, which is disposed above the inner compartment inside the cylindrical vessel and whose lower end is located above the inner compartment and is at a location higher than an upper edge of the partitioning cylinder, and wherein the process solution in the outer compartment enters the inner compartment over the upper edge of the partitioning cylinder in a reaction proceeding by the stirring of the blades. See claim 4.

Furthermore, it is respectfully submitted that these references as applied by the Examiner would have neither taught nor would have suggested such a stirring apparatus as in the present claims, having, inter alia, a compartment inside of which a process solution provided is reacted, with stirring blades disposed in the compartment which stirs a process solution thereinside and rotates around the center of the compartment, and wherein the apparatus further includes a rotating shaft for the stirring blades of the compartment, fixed to the stirring blades, which is disposed above the compartment inside the cylindrical vessel and whose lower end is located above the stirring blades and the process solution, so that the stirring blades disposed in the compartment are disposed without any counterpart rotating shaft at the center in the compartment, around which center the stirring blades rotate. See claim 10.

In addition, it is respectfully submitted that these references do not disclose, nor would have suggested, such stirring apparatus as in the present claims, having features as discussed previously in connection with claims 4 and 10, and having additional features as described in dependent claims, including, inter alia, wherein the stirring blade disposed in the inner compartment is also fixed to the rotating

shaft, at a location higher than the upper edge of the partitioning cylinder (see claim 8); and/or wherein the rotating shaft does not extend into the compartment (see claim 12); and/or wherein the stirring blade, e.g., disposed in the inner compartment is fixed to the rotating shaft, at the lower end thereof (see claim 9; note also claim 11); and/or wherein the stirring apparatus further includes a heater disposed inside at least one of the inner and outer compartments, which heats the process solution thereinside (see claim 5), and/or further comprises another outlet disposed inside the cylindrical vessel through which a volatile matter generated during a process inside the inner or outer compartment is evacuated (see claims 6 and 7).

The invention as claimed in the above-identified application is directed to a stirring apparatus, useful, for example, for producing polyester-type polymer such as polybutylene terephthalate and polyethylene terephthalate, but also having various other uses. In the following, the stirring apparatus is discussed primarily in connection with forming polyesters, but is not limited to such use (which is illustrative). In particular, the present invention is directed to such a stirring apparatus which is highly effective for polycondensating an oligomer to provide a low polymerization product, in forming the above-referred-to polyester.

In previously proposed apparatuses for forming polyesters, a second reactor has a vessel with a double cylinder structure therein (having an inner cylinder opening in the vessel and an inlet for process solution at the lower part of the double cylinder structure), the process solution passing through tubes of a shell and tube type heat exchanger provided on the outside of the inner cylinder of the double cylinder structure and thereby being heated to a predetermined temperature and passing upwardly to the level of the inner cylinder opening and then flowing down through the inner cylinder while the process solution is stirred with a plurality of

donut-shaped trays provided on the inside wall of the outer cylinder. The vessel is provided with an outlet for volatile matter and reaction by-products at the upper part thereof. However, the present inventors have found various needs for improvement in such proposed reactor, and, in particular, that short passing of reaction solution through the reactor, and thermal decomposition reaction of the process solution, needs to be eliminated.

Against this background, Applicants provide an apparatus which can be used for eliminating the above-mentioned short pass and thermal decomposition reaction, in forming the aforementioned polyesters, and which also has other uses, e.g., in reaction procedures utilizing stirring apparatus, Specifically, Applicants have found that through use of the stirring blade and rotating shaft arrangement as in the present claims, the problems in connection with previously proposed apparatuses can be avoided; and, in particular, the aforementioned short passage and thermal decomposition reaction can be avoided. In particular, by providing the stirring blades in outer and inner compartments as in the present claims, with the rotating shaft as in the present claims, the stirring blades in the outer compartment (first compartment 406 in Fig. 4) can rotate at a higher peripheral speed than stirring blades in the inner compartment (second compartment 407 in Fig. 4); and noting that the process solution in the outer compartment has a relatively low viscosity as compared to that in the inner compartment (wherein further polymerization has occurred), a same level of stirring effect in the inner and outer compartment can be achieved. In addition, since there is no counterpart rotating shaft at the rotating center in the inner compartment, there is no fear at all of deposition of process solution onto the rotating shaft with resulting deterioration. Note the paragraph bridging pages 20 and 21 of Applicants' specification.

According to the present invention, the stirring apparatus as defined in the present claims can contribute to efficient and continuous production of polyester having a good quality, by intensively conducting complete mixing of process solution in at least two partitioned reaction compartments, while transferring the process solution from one reaction compartment to another by overflow or spontaneous flow without using any piping or transfer means, thereby eliminating occurrence of short pass and thermal decomposition of the process solution therein. See the paragraph bridging pages 28 and 29 of Applicants' specification.

Weber discloses a process and apparatus for treating substances in several stages, and, more particularly, to an apparatus for effecting the reaction between solids and liquids in a single tank reactor. In its apparatus aspect, Weber discloses structure including a treatment vessel having a bottom surrounded by a substantially upright boundary wall; a substantially upright inner wall upstanding from the bottom to define an inner compartment surrounded by the outer compartment defined between the boundary wall and the inner wall; agitation devices arranged at spaced intervals in the outer compartment and operable to provide a series of agitation zones surrounding the inner compartment; partition means in the outer compartment between the boundary wall and the inner wall; means for introducing at least one substance to be treated into a first agitation zone adjacent one face of the partition means; a final agitation zone in the outer compartment adjacent the face of the partition remote from the first agitation zone; a flow transfer passage leading into the inner compartment from the final agitation zone of the outer compartment; and means for withdrawing treated material from the inner compartment. See column 1, lines 24-42. This patent further discloses that it is preferred that the treatment vessel be enclosed, thus making it possible to vent the entire vessel through a single fume

discharge stack leading out through the top. Note column 1, lines 48-51. Note, in particular, Figs. 1 and 2 of Weber, and corresponding descriptions in connection therewith at column 3, lines 15-28 and 57-63.

Initially, it is noted that Weber has a plurality of agitators 12, 13, etc., rotating around different rotation axes distributed through the outer compartment. It is respectfully submitted that this reference does not disclose, nor would have suggested, the stirring blade disposed, inter alia, in the outer compartment, rotating concentrically around the center of the cylindrical vessel.

In addition, as can be seen in Fig. 2 of Weber, the agitator 32 is provided on a shaft extending into the inner compartment. It is respectfully submitted that the disclosure of this patent would have taught away from the various aspects of the present invention wherein the rotating shaft is disposed above the inner compartment inside the cylindrical vessel and whose lower end is located above the inner compartment and is at a location higher than an upper edge of the partitioning cylinder, as in claim 4; and/or the definition of the rotating shaft in claim 10, disposed above the compartment inside the cylindrical vessel and whose lower end is located above the stirring blades, so that the stirring blades disposed in the compartment are disposed without any counterpart rotating shaft at the center in the compartment, around which center the stirring blades rotate; and/or more specific recitations in connection with the stirring blades/rotating shaft as claims 8, 9, 11 and 12.

It is respectfully submitted that the teachings of Buchanan would not have rectified the deficiencies of Weber, such that the presently claimed invention as a whole would have been obvious to one of ordinary skill in the art. Buchanan discloses a process of making hydrocyanic acid from crude cyanides derived from lime nitrogen, one form of apparatus for carrying out this process being shown in the

figure of this patent and being described on page 1, lines 12-25. As can clearly be seen in the figure in Buchanan, a single reactor is shown, with an absorption tank next to the generating vessel 1.

Initially, it is emphasized that Buchanan is concerned with making hydrocyanic acid. It is respectfully submitted that one of ordinary skill in the art concerned with in Weber, for treating substances in several stages, would not have looked to the single generating vessel shown in Buchanan.

In any event, even assuming, arguendo, that the teachings of Weber and Buchanan were properly combinable, it is respectfully submitted that such combined teachings would have neither taught nor would have suggested the apparatus as in the present claims, including the stirring blades/rotating shaft in claim 4; and/or positioning of the rotating shaft as in claim 10, and/or other features of the present invention as discussed in the foregoing, and advantages of the features of the present invention.

The Examiner refers to stirring blades 12-16 and 32 as in Weber. Note the paragraph bridging pages 2 and 3 of the Office Action mailed March 7, 2006. However, it is respectfully submitted that these stirring blades 12-16 of Weber, referred to by the Examiner, are distributed at different locations in the outer compartment, with a respective axis of rotation of each of the blades 12-16 being at respective locations of the agitators, and separate from the axis of rotation of the agitator 32. It is respectfully submitted that, clearly, Weber would have taught away from the stirring blades as in, for example, claim 4, with each of the stirring blades rotating concentrically around the center of the cylindrical vessel.

The contention by the Examiner that Buchanan discloses a stirrer (7) that has several stirring blades attached to it and is operated by a driving means at the top of

the vessel, set forth on page 3 of the Office Action mailed March 7, 2006, is noted. It is emphasized that in Buchanan a single compartment is described, having agitator 7 therein. Such disclosure in Buchanan, even in combination with the teachings of Weber, would have neither taught nor would have suggested the stirring blades/rotating shaft as in, for example, present claim 4; and clearly would have taught away from the stirring blades/rotating shaft relative to the compartment in the vertical cylindrical vessel, or stirring blades/rotating shaft relative to the inner and outer compartments, as in claims 4 and 10; note especially claims 8, 9, 11 and 12.

Furthermore, note that claim 4 recites that the processing solution in the outer compartment enters the inner compartment over the upper edge of the partitioning cylinder in a reaction proceeding by the stirring of the blades. Clearly, this is different from the transfer of treating substance between the outer and inner compartments in Weber; and it is respectfully submitted that the teachings of Weber would have neither disclosed nor would have suggested that aspect of the present invention as set forth in the "wherein" clause at the end of claim 4.

With the structure according to the present invention, including the transfer of process solution and the rotating shaft/blades, retardation of the process solution is suppressed and the process solution is uniformly stirred so that quality of the process solution is improved.

In contrast, note that according to Weber a plurality of agitators are provided distributed around the annular outer compartment, each rotating on its individual axis. According to Weber, in order to obtain uniform reaction of the process solution, a plurality of reaction chambers is provided in, e.g., the outer compartment, with a process solution before the reaction being supplied to a reaction chamber at one end of the reaction vessel, and the process solution being transferred chamber by

chamber through the outer compartment. In the annular-shaped outer compartment, a plurality of agitators having rotating shafts and blades is positioned on the same circumference; and a process solution introduced to the one end part is stirred by the agitators, transferred to another end part, and introduced into the inner chamber through a transfer duct formed in an upper part of the cylindrical compartment wall. In the outer chamber of the apparatus in Weber, the process solution is stirred by the plurality of agitators separately positioned, which rotate around the shafts as the process solution is transferred to the end part of the outer compartment from which the process solution is transferred into the inner compartment. Flows of the process solution in Weber are complicated, and directions of flow cross or conflict with one another, constituting a turbulent flow. Such turbulent flow tends to cause retardation of the process solution. For example, some parts of the process solution are retained in the vicinity of one end before reaching another end, and other parts of the process solution swiftly reach another end without retardation. Thus, there occurs a problem that the process solution is not uniformly stirred, in Weber.

In contrast, according to the present invention uniform and effective stirring is achieved, by partitioning the cylindrical vessel into inner and outer compartments and disposing stirring blades in the inner and outer compartments, with the stirring blade in the outer compartment being fixed to the rotating shaft which is positioned above the partitioning cylinder and inner compartment and is concentric to the outer compartment. The stirring provided by the stirring blade, e.g., in the outer compartment does not cause turbulent flow and achieves uniform stirring. Thus, the process solution in the outer compartment proceeds to the reaction as a whole, with effective and efficient stirring by the stirring blade. Moreover, the process solution which has been stirred in the outer compartment enters the inner compartment over

the edge of the partitioning cylinder. Accordingly, since stirring of the process solution can be achieved as discussed in the foregoing, according to the present invention, reaction of the process solution can be effected uniformly, and quality of the process solution is improved.

In view of the foregoing comments and amendments, reconsideration and allowance of all claims presently in the application are respectfully requested.

Applicants request any shortage in fees due in connection with the filing of this paper be charged to the Deposit Account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (case 500.40566CC3), and credit any excess payment of fees to such Deposit Account.

Respectfully submitted,

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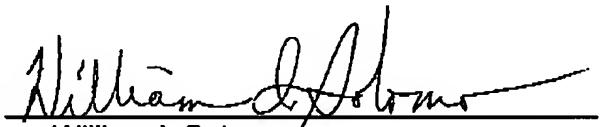
By 
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